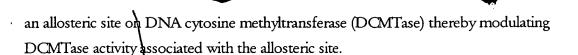
- 5. The synthetic oligonucleotide of claim 1, wherein the DCMTase is from a mammal, bird, fish, amphibian, reptile, insect, plant or fungus.
- 6. The synthetic oligonucleotide of claim 5, wherein the mammal is selected from the group consisting of mouse and human.
- 7. The synthetic oligonucleotide of claim 1 having an inhibition constant of not greater than 1000 nM.
- 8. The synthetic oligonucleotide of claim 7 having an inhibition constant of not greater than 200 nM.
- 9. The synthetic oligonucleotide of claim 8 having an inhibition constant of not greater than 20 nM.
- 10. The synthetic oligonucleotide of claim 1 comprising a nucleotide sequence as shown in Figure 1B and designated GC-box b^{MET} (SEQ ID NO:10), GC-box p^{MET} (SEQ ID NO:13), GC-box d^{MET} (SEQ ID NO:14), GC-box e^{MET} (SEQ ID NO:15), or CRE a^{MET} (SEQ ID NO:11).
- 11. A method of inhibiting methylation of DNA comprising contacting a DCMTase with a synthetic inhibitor molecule so as to form an enzyme/synthetic inhibitor molecule complex in the presence of the DNA, wherein the synthetic inhibitor molecule comprises a C-5 methylcytosine which recognizes and binds an allosteric site on DCMTase, thereby inhibiting DNA methyltransferase activity.
- 12. A method of inhibiting proliferation of cancer cells comprising administering to a subject a synthetic inhibitor molecule which recognizes and binds an allosteric site on DCMTase thereby resulting in an enzyme/synthetic inhibitor molecule complex, the presence of the complex inhibiting DCMTase-mediated methylation of DNA, thereby inhibiting proliferation of the cancer cells.
- 13. The method of claim 12, wherein the cancer cell is from lung, breast, prostate, pancreas or colon.
- 14. The method of claim 11, wherein the synthetic inhibitor molecule is a synthetic oligonucleotide comprising a C-5 methylcytosine and which recognizes and binds



- 15. The method of claim 12, wherein the subject is a human.
- 16. The method of claim 12, wherein the subject is an animal.
- 17. The method of claim 16, wherein the animal is porcine, piscine, avian, feline, equine, bovine, ovine, caprine or canine.
- 18. A method of Identifying a molecule which recognizes and binds an allosteric site on DCMTase comprising:
 - (a) contacting a molecule with DCMTase in the presence of DNA and AdoMet;
 - (b) measuring DCMPase activity, an increase or decrease in DCMTase activity being indicative of a modulator of DCMTase; and
 - (c) determining whether the modulation of DCMTase activity is via binding an allosteric site on DCMTase.
 - 19. The method of claim 18, wherein the modulator is an inhibitor.
- 20. The method of claim 18, wherein DCMTase activity is measured using a steady-state assay.
- -21. The method of claim 12 wherein the synthetic inhibitor molecule comprises a C-5 methylcytosine.
- 22. The method of claim 12, wherein the synthetic inhibitor molecule is a synthetic oligonucleotide comprising a C-5 methylcytosine and which recognizes and binds an allosteric site on DNA cytosine methyltransferase (DCMTase) thereby modulating DCMTase activity associated with the allosteric site.
 - 23. The method of claim 14, wherein the subject is a human.
 - 24. The method of claim 14, wherein the subject is an animal.